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ing for the Jefferson Medical College, of Philadelphia, which will be erected at the corner of Walnut and 10th streets, occupying a space of 118 feet by 107 feet. It appears, from the plans, that very complete arrangements have been made for laboratories, lecture rooms and dissecting rooms.

A DONOR, whose name is withheld, has subscribed \$25,000 for Barnard College in case the \$100,000 needed to liquidate the debt on the College is subscribed by October 3d. \$23,000 had previously been subscribed.

PROFESSOR JAMES SETH, who now holds the chair of moral philosophy at Cornell University, has been elected professor of moral philosophy in the University of Edinburgh, to fill the chair vacant by the death of Professor Calderwood.

DR. CHARLES H. JUDD, Wesleyan University, has been called to a chair of psychology in New York University.

DISCUSSION AND CORRESPONDENCE.

REMARKS ON THE METHOD OF THE 'NEW PSYCHOLOGY' WITH MEMORY.

TO THE EDITOR OF SCIENCE: Dr. Scripture's 'The New Psychology' is an interesting and useful résumé of the results of a certain order of investigation whose value and significance seems at present, however, debatable. The author wishes, and wishes rightly, to reduce psychology to an exact science, but does not science mean a complete and special investigation of the circumstances affecting any phenomenon? Take thus the phenomenon of memory: Does not a scientific study of it require a thorough and special investigation of all factors psychical that affect it, to show their interrelation, and by isolation to show their relative values? Is not this method required of the biologist who studies the phenomenon of cross-fertilization or of the physicist who studies crystallization, and shall we be less rigid for the psychologist who studies memory? Now Mr. Scripture starts out with the assumption that a memory is a function of one element, physical time, and interprets wholly by this factor, lumping all other elements under a mere general reference to 'circumstances' and the 'individual.' It is not to be denied that

physical time by pendulum beats has some relation to memory, but Mr. Scripture certainly fails to make clear that he has isolated this phenomenon, which is, moreover, of minor importance. Memory is far more a function of interest than of time, either physical or psychological. For instance, in the experiment detailed (p. 189) the matter of seconds and minutes is not the main determinant of decreasing memory with the experimenter. On the contrary, interest, his interest in accuracy, in success, etc., is the main factor to be investigated, and to study memory without definitely studying interest is like testing speed of locomotives without reference to motive power. That a locomotive moves at certain reduced velocities after certain lapses of time does not imply that time *per se* has reduced velocity in given ratio, but that this ratio is dependent on the initial head of steam, lubricity of parts, etc. Now the motive power of memory is interest, and mere lapse of time operates mainly, at least, merely as allowing room for conflicting interest. It is plain that if in the experiment referred to the agent was influenced by life and death motive, or even by some greatly desired prize, the memory power would be indefinitely strengthened. What very intensely interests us we always remember, and often with increasing vividness, for memories becoming cumulative in effect may reinforce each other so as to more than offset lapse of time. We also note that the aged man recalls the scenes of youth much more accurately and freshly than when he was middle aged. We know also that interest quite reverses the time law in the case of one who after some years absence returns to his former dwelling place, when events and places concerned with his life some time before his absence are recalled with accuracy far greater than if he had had continued residence.

It is certainly very desirable that we should attain to some scientific understanding of the relation of interest to memory, but first we must devise some method of measuring interest. But any real science of memory cannot neglect that by which memory has been originated and developed, namely, interest.

But the whole standpoint of 'the New Psy-

ehology' is unpsychological. Psychology is not primarily concerned with the time of sense, but with the sense of time, that is, it is not primarily concerned with the physical or physiological. Hence to make memory merely some simple function of time, as logarithmic, just as we find gravity to vary inversely as the square of the distance, is an enticing but false simplification of psychic act. While the physics of psychology is an interesting if somewhat limited field, it does not deserve the term 'the New Psychology.' 'The New Psychology' is that which has felt the stimulus of evolutionism, and whose standpoint is not physical but biological. The psychic phenomenon is a life method, and thus memory is a function of and for life, a mode of building up experience into a whole which should serve the individual and race as a sort of psychic capital.

Now the failure to take biology as the main standpoint leads to the very unsatisfactory remark (p. 208) that similarity, contrast, etc., are not real laws of association in memory, but only 'schemes for classifying associations,' and that the 'real law' has never been found. That is, we understand that some psycho-physical law yet undiscovered is the real scientific explanation, and the present psychology of memory by laws of similarity, contrast, etc., has little or no value. But appreciation of likeness and sameness, for instance, is of the greatest importance to the living organism, as in recognition of food, mate, etc., and hence it has become a prime method or law of mental organization. Mind in animals and men is not a general exhibition of elemental energy in space and time, but a practical device for the advantage of the individual and posterity; hence the laws of association, as commonly given, are vital laws and real laws of connectivity in mind reaching to adaptation.

We conclude that to come to the study of mind by the way of physics is to come by a back door. While we should certainly try to enter by every door that can be found back, side or front, yet the best, most comprehensive and reasonable view comes by way of the front entrance through biology.

HIRAM M. STANLEY.

LAKE FOREST, ILL., April 25, 1898.

THE CAUSES OF NATURAL ARCHES.

TO THE EDITOR OF SCIENCE: The note in your April 22d number regarding the natural bridge in Utah is interesting, but I should like to supplement it by stating another interesting thing, namely, that there are in the great arid region a large number of these natural arches. In the Canyon of Desolation, on Green River, they are particularly common, and from the surface of the river some of them seemed of huge proportions. All I have seen occur in formations exactly similar in kind—homogeneous sandstones with tendencies toward conchoidal fracture—and my observations are against the wind erosion theory as a prime factor.

The beginning appears generally to be in some natural crevice or cleft on the face of the bare cliff wall, where water is able to penetrate and allow frost to start operations by throwing out a fragment that leaves a cavity almost a miniature of the final perforation which marks one further period in the demolition of the cliff. This fragment is followed by many others, till the cavity presents the appearance of an alcove with arched top, and a talus floor. The arch gradually deepens into the cliff, and I have seen one so deep that its floor was a lake, with a grove of trees at the opening. Frequently, if not generally, the deepening is assisted by water percolating from above.

At a certain depth, if the cliff is a thick one, the arch begins to protect itself, and the excavation proceeds more slowly. It becomes a cave with floors of various character according to circumstances that vary with other conditions. But if the cliff is comparatively thin the wearing finally cuts through to the opposite side, and then wind erosion becomes a more potent factor. I have seen many examples of every stage of progress, and I have seen at least one beginning where a rain torrent was in active operation, and made a sketch of it. Frost, and the disintegrating and dissolving power of water combined with structural tendencies, appear therefore to be the chief causes of these natural arch forms.

F. S. DELLENBAUGH.

NEW YORK, May 3d.